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FOR DOWNTOWN BOSTON

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STUDIES OF URBAN TRANSPORTATION

Seminar Research Bureau College of Business Administration
BOSTON COLLEGE MARCH 1958

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TRANSPORTATION FACTS AND PUBLIC POLICY

FOR DOWNTOWN BOSTON

ERRATA

Page	Paragraph	Line	
15	1	1	"per" should read "for"
15	4	7	"lane" should read "land"
26	4	2	"inter-causal" should read "inter-censal"
29	3	5	Should read "...new spaces in addition to ..."
35	1	10	"indicate" should read "indicates"
39	3	2	"...by the creation..." should read "..be the creation"
39	3	3	"withing" should read "within"
42	3	1	"be" should read "we"

STUDIES OF URBAN TRANSPORTATION

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TRANSPORTATION FACTS AND PUBLIC POLICY FOR DOWNTOWN BOSTON

STUDIES OF URBAN TRANSPORTATION

Seminar Research Bureau College of Business Administration
BOSTON COLLEGE MARCH 1958

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SUMMARY OF RECOMMENDATIONS

The provision of transportation facilities to accommodate two and one-half million people is the most pressing problem in the Boston region. The most severe part of this general problem is the specific task of accommodating over 1,100,000 trips into and out of Downtown Boston. The Downtown area depends for its survival as a center of economic activity upon maintaining its accessibility. Given improvement in accessibility the Downtown area can grow moderately and can continue to perform an economic function vital to the health of the region.

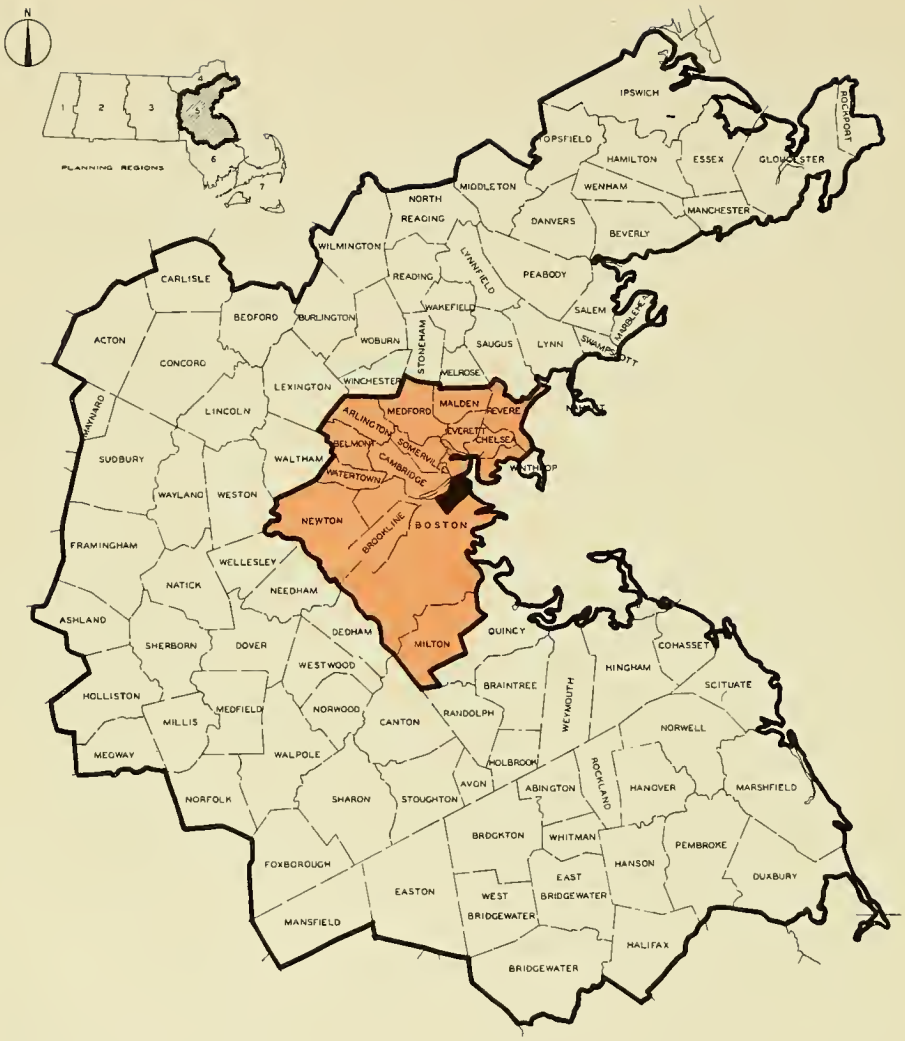
The original system of expressway facilities as outlined in the 1948 Master Highway Plan has been fully justified and endorsed by several administrations and by expert engineering opinion. The system should remain as the basic regional plan for expressway development. Modifications should be fully justified in terms of the impact they will have on Downtown congestion and parking. The rumored abandonment of the Inner Belt and the Southwest Expressway does not appear justified nor is the Toll Road extended through Downtown to the Central Artery an adequate substitute for the Inner Belt. A connection providing interchange with the Toll Road at Route #128 and the Inner Belt is a vital component of the regional expressway system. A toll road extension through Downtown Boston acting as a substitute for the Inner Belt will destroy the workability of the expressway system and place on the Central Artery more vehicles than it can possibly handle.

Automobiles alone cannot fully service the Downtown area. A reasonable balance must be found between the use of the automobile and mass transportation in serving travel. The community must strengthen its mass transportation facilities. Moderate length MTA extensions along selected railroad rights-of-way offer a partial solution to the railroad crises. Although such a physically integrated mass transportation system will provide the most efficient service, it will not be a panacea for mass transportation deficits.

Development of a master transportation plan which expresses the general objectives of the community is essential. It will be achieved only when the many agencies engaged in highway and street construction and those engaged in mass transportation begin to develop plans that complement rather than compete with one another. While there seems to be overlapping in the functions of some of the highway agencies, the principal weakness of the present organizational structure is the absence of any planning agency able to develop or review transportation plans.

The absence of an agency equipped to study and judge transportation schemes has made it difficult for the public to be informed concerning the value of various proposals. In many cases the public has been a confused observer of contests between those that control public agencies. The current condition of rumor and counterrumor, concerning proposals for transportation facilities is ample evidence of the absence of either a recognized plan or clear objectives.

1. Complete the regional expressway plan developed in 1948. Emphasis should be placed on the Inner Belt, the Southwest Expressway and a connection between the Massachusetts Turnpike at Route 128 and the Inner Belt.
2. Encourage improvements to the design of the expressway system but review with care recommendations for changing the fundamental concept of providing radial and circumferential access. All changes should be assessed in terms of the implications upon Downtown land and local traffic requirements.
3. Improve Downtown street access through redesign, classification and improvement of local streets.
4. Complete with speed the present private and public off-street parking programs amounting to 10,000 to 15,000 additional spaces.
5. Introduce the pricing system as a means of regulating parking space use and encourage short term parking.
6. Coordinate present and future programs of highway construction with urban renewal and redevelopment projects.
7. Create a single, physically integrated regional mass transportation system.
8. Prepare an immediate development survey to indicate the desirable kinds of mass transportation service expansion to include:
   a. Rapid transit extensions with consideration given to the use of the following railroad rights of way.
      Old Colony Division to Quincy and Braintree
      West Roxbury Branch to Roslindale and West Roxbury
      Boston and Maine tracks to North Cambridge and Somerville
      Boston and Maine tracks to Malden, Melrose or Medford
   b. Development of expressway bus and terminal parking facilities
9. Prepare engineering plans for rapid transit extension along the Old Colony Division.
10. Undertake a comprehensive analysis of mass transportation finances, deficit and deficit assessment procedures and possibilities.
11. Conduct comprehensive regional transportation planning.



THE BOSTON REGION

METROPOLITAN TRANSIT DISTRICT

DOWNTOWN BOSTON

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INTRODUCTION

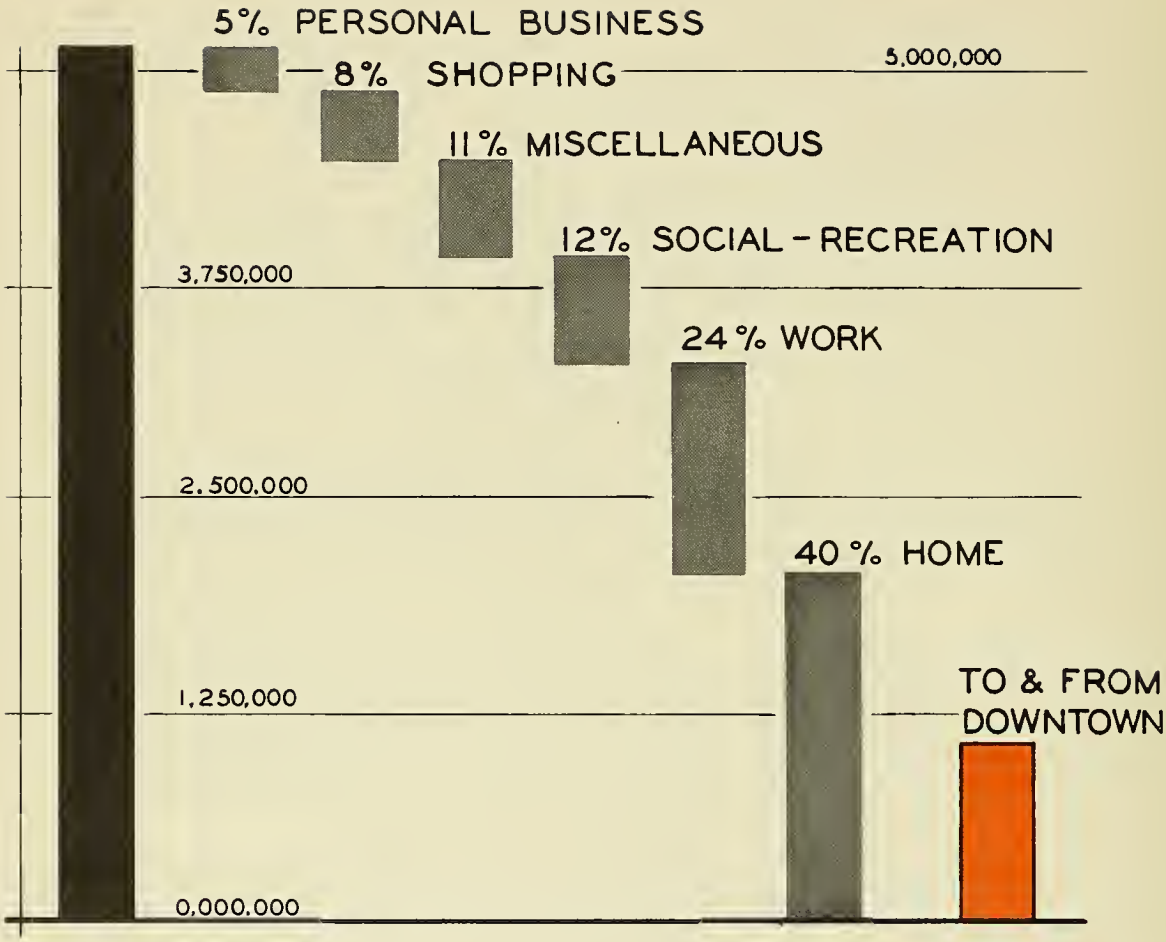
This Document has been prepared to present facts on travel to Downtown Boston and to draw from these reasonable conclusions concerning the direction public policy should take. This represents an attempt to return to fundamentals and to provide the citizen with information with which he can evaluate the many programs proposed for the Downtown Area.

Transportation problems are regional in scope. Travel within this region does not confine itself to political boundaries but distributes itself throughout the economic and social entity called Metropolitan Boston, therefore the problems are of concern to all.

The area of basic concern to these "Studies of Urban Transportation" is shown on the map on the opposite page. It consists of the 100 cities and towns of east central Massachusetts. It includes those cities and towns surrounding Boston in which travel is oriented towards the center of the metropolis.

The area shown shaded in color is the Metropolitan Transit Authority District, and the area shown in solid black is Downtown Boston.

Despite, or perhaps because of its size Downtown Boston is the apex of transportation woes. These woes are worthy of a complete analysis in themselves. This Report confines itself to Downtown Boston and its transportation difficulties.



TOTAL DAILY REGIONAL BOSTON TRIPS

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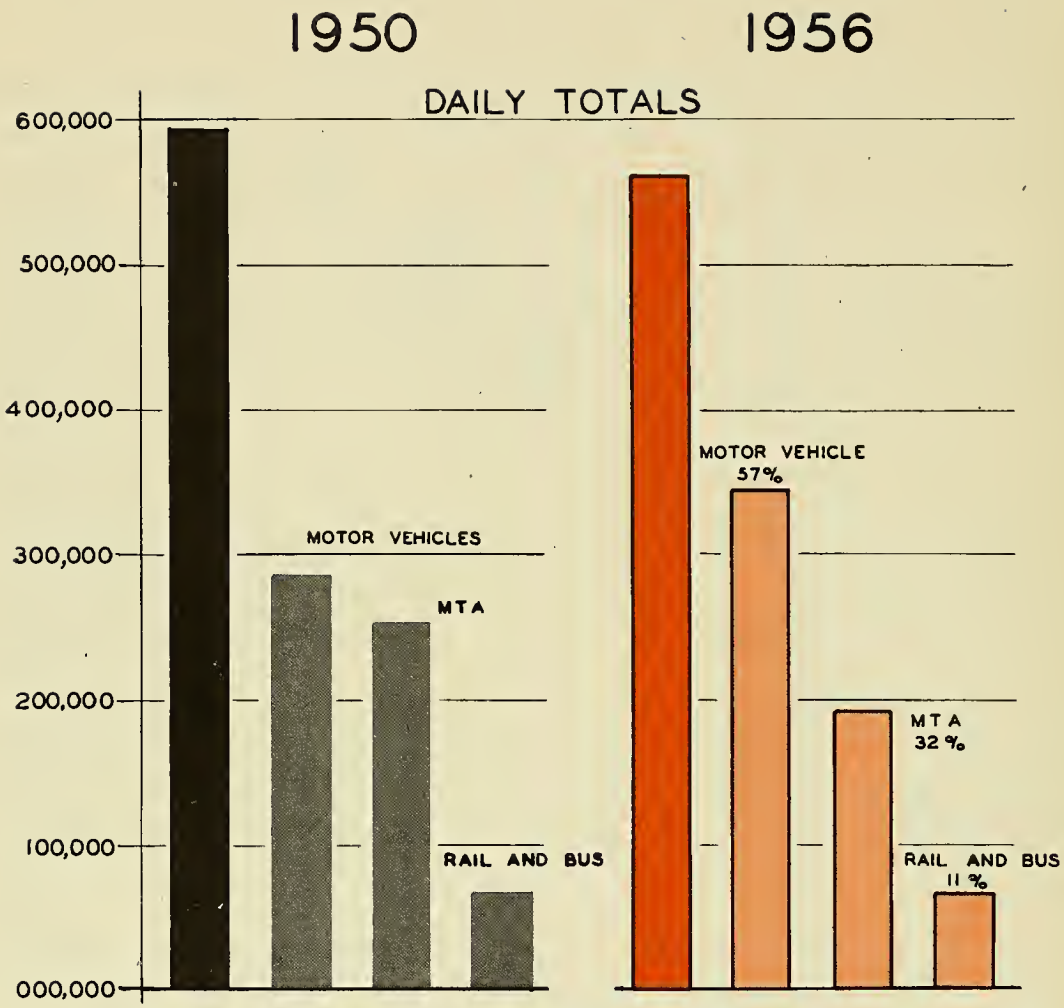
REGIONAL TRIPS

Two and one half million people live, work and play in the Boston Region. They make over five million trips on an average weekday. These are trips for all purposes by all modes of transportation and include trips to and from work, for shopping, for recreation, business and other purposes.

The total number of trips and the purposes for which they are made vary from day to day depending upon the weather, conditions of transportation facilities, the number and kind of functions taking place, the day of the week, the week of the year and other factors. They are spread throughout the 24 hours of the day and throughout the thousands of miles of streets and railways of the entire region.

The area which attracts the largest number of trips is Downtown Boston. As the chart shows, about one fifth of the total daily regional trips are made to and from the Downtown area. This high proportion indicates the vitality and importance of the Central Business Area.

The number of trips made daily within the region is increasing each year. A growing population and an increase in the number of jobs, shorter working hours, and expanding volumes of automobile usage all contribute to greater travel. It might be asked how much will travel increase; how much of this increase will be to Downtown; and what facilities will be necessary to accommodate it?



MODE OF TRAVEL TO DOWNTOWN BOSTON

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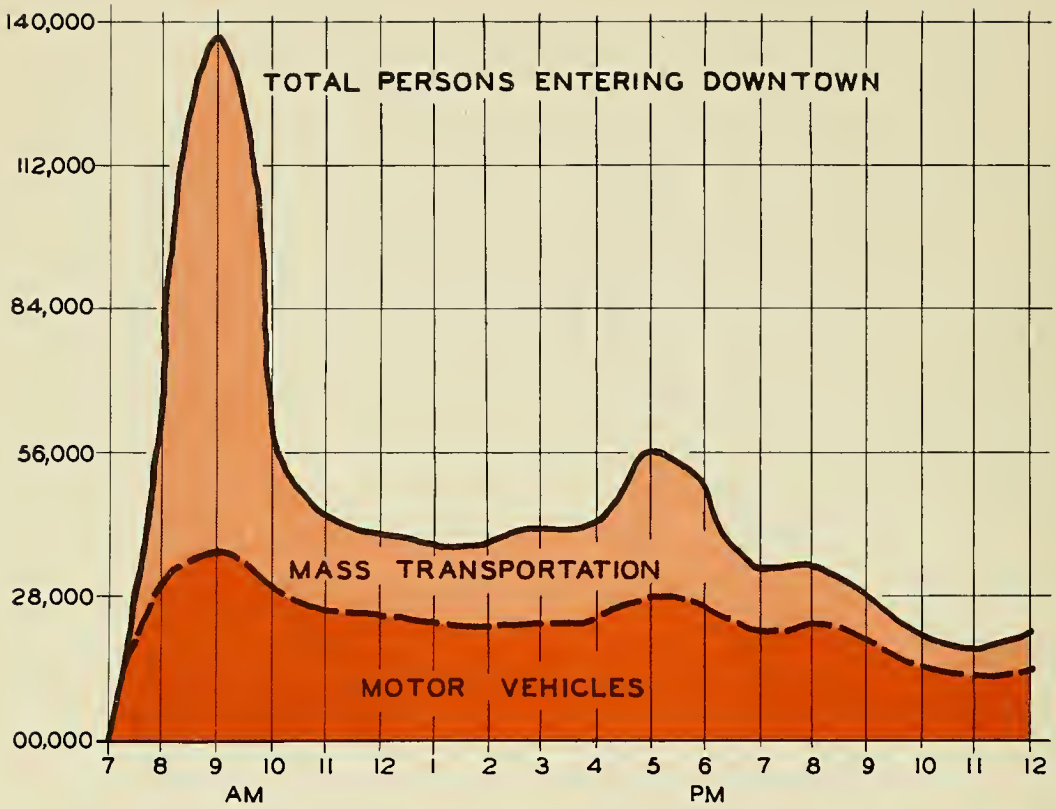
DOWNTOWN TRIPS

The number of daily trips to Downtown Boston had decreased since 1950 from nearly 600,000 to about 560,000 person-trips. Over the same span of time travel to Downtown by automobile has increased slightly. Mass transportation facilities have absorbed the entire loss in total travel. The MTA has lost some 40,000 riders per day to Downtown and an equal amount travelling from Downtown. The railroads, too, have experienced decreases in commuter traffic.

The increase in automobile travel to Downtown Boston has not been great - about a 10% increase over 1950. This increase is equal to the additional capacity of new highways leading into Downtown and the new off-street parking spaces provided.

The chart shows that in 1956 motor vehicles transported over 55% of the people into Downtown Boston, the entire area inside of Massachusetts Avenue. Motor vehicles play a much less important role in servicing the more heavily developed commercial parts of this area. For example, only 25% to 30% of those going to the retail area in the heart of Downtown go by motor vehicle. Only about 45% of those destined for the office district use motor vehicles.

The purpose of trips to Downtown are much the same as those made throughout the region as a whole. Because Downtown contains the central commercial and retail areas of the region trips to work and for shopping are of slightly greater importance.



HOURLY DISTRIBUTION OF PERSONS ENTERING DOWNTOWN BOSTON

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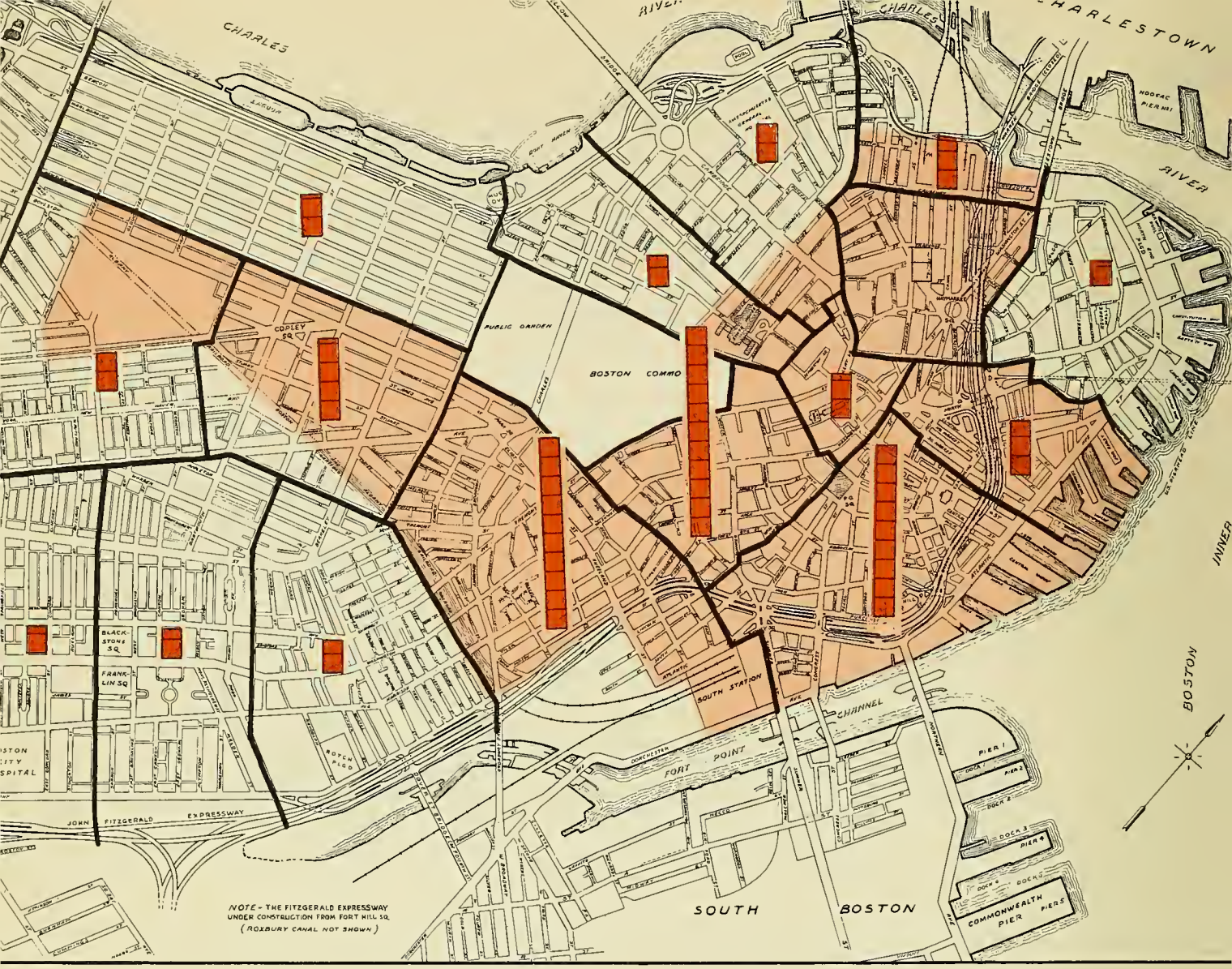
PEAK HOUR FLOW

The demands on transportation facilities vary in importance throughout the day. Travel to and from Downtown is at its peak from 7:00 to 9:00 a.m. and from 4:00 to 6:00 p.m. During these hours highways are used to full capacity but mass transportation facilities are called upon to serve 70% of the people. In fact during these hours mass transit does the bulk of its business and remains virtually idle the remainder of the day. These conditions emphasize a key problem of the mass transportation industry throughout the large cities of the nation, but also indicate that centralized commercial areas cannot exist without it.

The graph shows the hourly distribution of all people entering Downtown Boston and the distribution of those entering in motor vehicles. The difference between the two (shown in light color) is the number entering the area on mass transportation facilities. For the most part the great influx from 7:00 to 9:00 are the people who work in the many Downtown buildings.

The mid-day unused capacity of mass transportation facilities is a potential asset to the community but in an era of automotive travel an asset not likely to be utilized. Mid-day travel for shopping, business and other purposes is increasingly by automobile.



DOWNTOWN BOSTON TRIP DESTINATIONS

CENTRAL BUSINESS DISTRICT

NUMBER OF TRIPS, EACH BLOCK = 10,000

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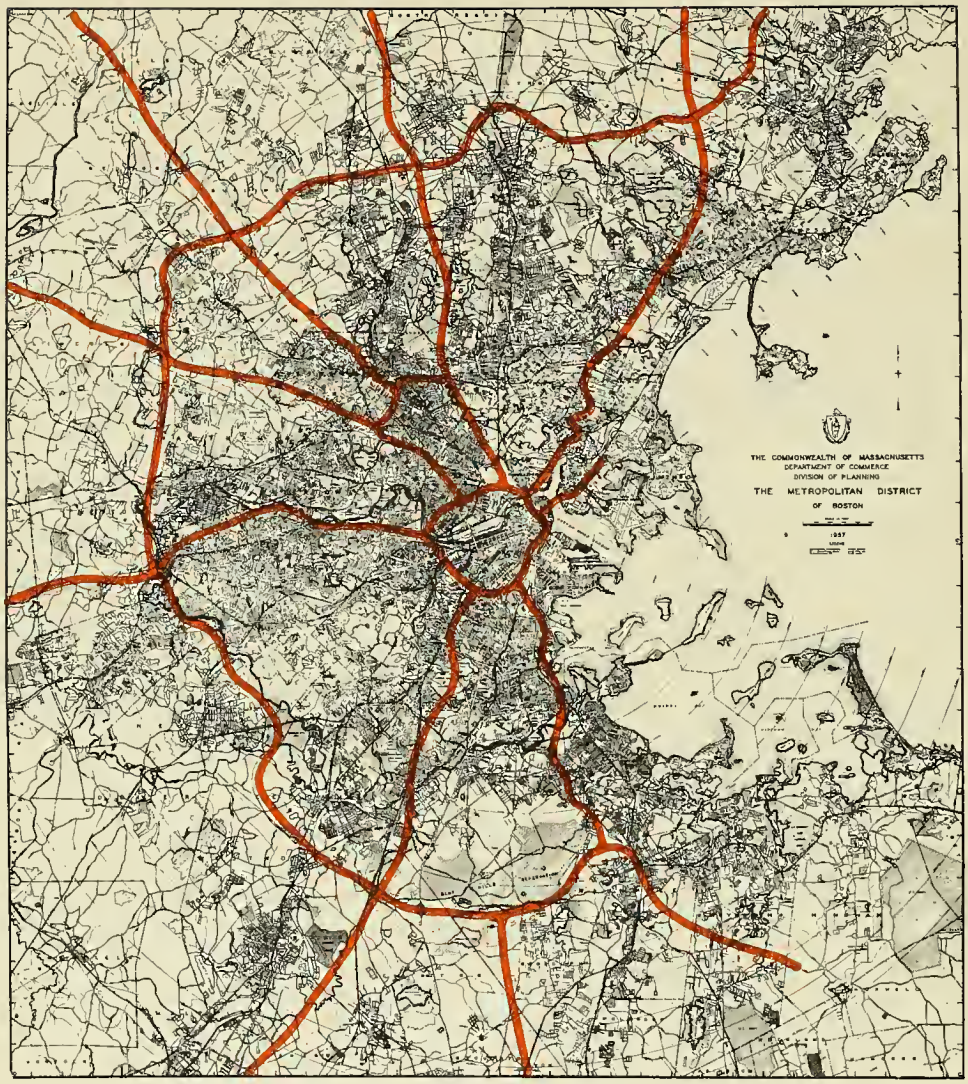
DOWNTOWN DESTINATIONS

Trips to the Downtown area are distributed irregularly over the area. The commercial districts attract many more trips than do the residential districts. In fact, the predominantly commercial areas (the retail, office, wholesale and manufacturing districts) attract about 2/3 of all trips destined for the Downtown Area.

Not only do the Downtown districts attract trips in rough proportion to the amount of development, or amount of floor space, within each district, but also in proportion to the use to which the floor space is put. For example, analysis shows that retail space attracts about twice as many trips per square foot as does office space. Similarly, office space attracts two to three times as many trips as wholesale and storage space.

These relationships between the amount and types of floor space and the volume of trips generated are reasonably stable over a period of time and can be used to predict traffic and travel consequences of new development. Consequently, if realistic objectives for downtown development are formulated, the traffic impact can be estimated and a transportation system can be designed to serve future as well as existing needs.



REGIONAL BOSTON EXPRESSWAY SYSTEM

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REGIONAL EXPRESSWAY SYSTEM

In 1948 a master highway plan was completed for the Boston Metropolitan Area. It was not a comprehensive transportation plan in that it did not include plans for mass transportation although the plan was based on the assumption of an improved and extended system of rapid transit. Expressway construction since that time has been in conformity with the patterns laid out in that plan. The system devised in this plan has been the basis of action by the General Court on highway construction loans and has had bi-partisan support through a number of administrations. Elements of the scheme have been the justification for federal participation.

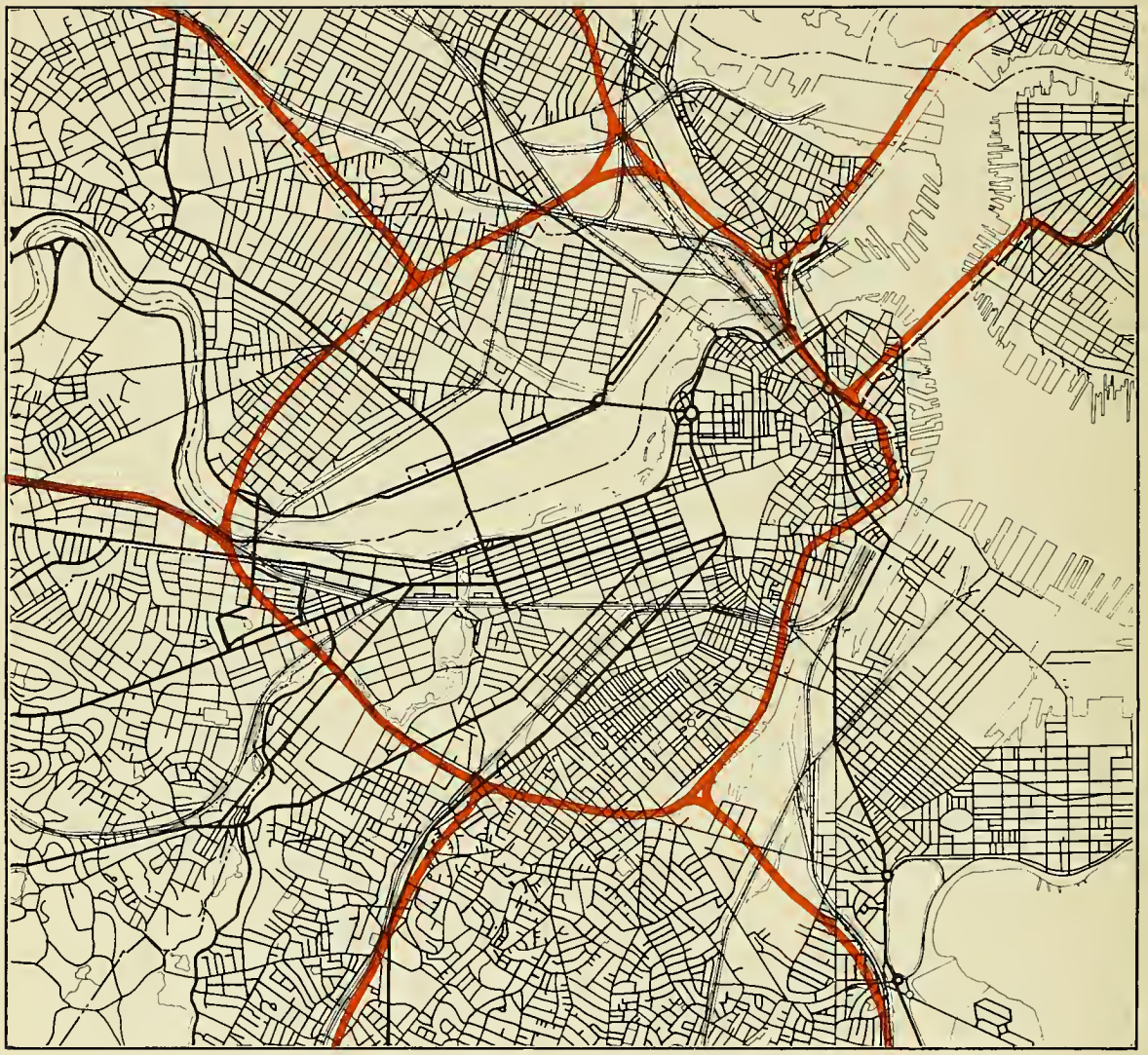
This planned expressway system of Metropolitan Boston consists of eight radials connecting the inner parts of the metropolis with the outer suburbs and all parts of New England. The radials of the expressway system will be linked together by the Inner Belt Expressway. The Inner Belt is part of an inner circumferential which, in conjunction with the Central Artery, will provide a circuit through and around Downtown Boston.

Counter clockwise from the northeast section of the region, the expressway radials are: East Boston Expressway (completed), Northeast Expressway (under construction), Northern Expressway (under construction), Northwest Expressway (under construction), Western Expressway (or Toll Road extension connecting Route #128 and the Toll Road with the Inner Belt), Southwest Expressway, and the Southeast Expressway (under construction). The reconstruction of Route #2 as an expressway represents a modification of this plan, but is not a departure from the basic pattern.

The latest study of traffic in the Boston Metropolitan Area prepared for the Massachusetts Department of Public Works contains as its first conclusion "The Master Highway Plan of 1948 for the Boston Metropolitan Area is confirmed as to the soundness of the plan and proposed location of the various expressways and belt route with such modifications as the Department of Public Works has been required to make because of development of certain land areas in the past ten years." (page 3, Report on Traffic Studies for the Boston Metropolitan Area, July 22, 1957, by Coverdale & Colpitts, Consulting Engineers.)

Despite this kind of endorsement and the investment in constructing elements of this plan there is an evident tendency to abandon the basic pattern laid down in this plan. Although there have been no official statements there has been increasing public discussion suggesting that the toll road be extended in to the Downtown area to connect with the Central Artery and that the Southwest expressway and the Inner Belt be abandoned.

Is the expressway plan to be abandoned and if so where is the new plan and its justifications?



INNER BOSTON EXPRESSWAY SYSTEM

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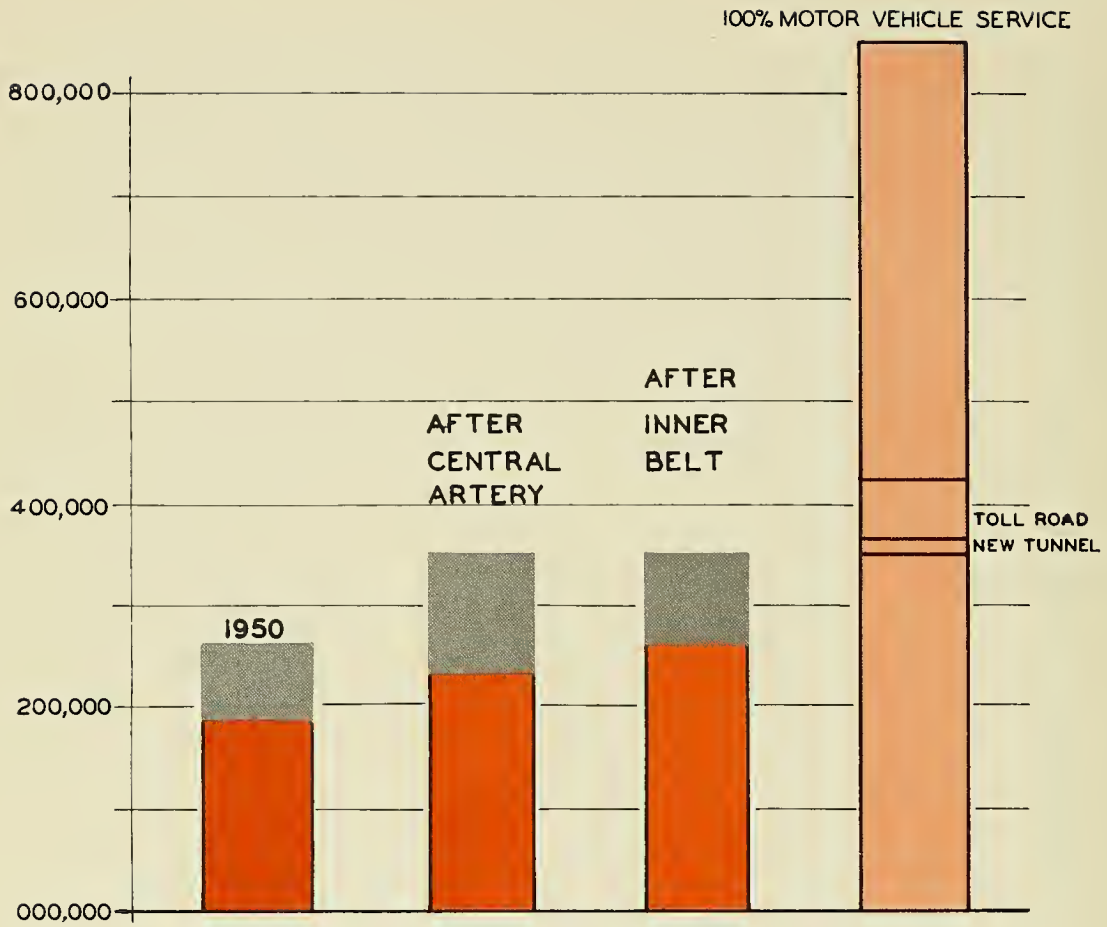
INNER EXPRESSWAY SYSTEM

A close examination of the design of the original expressway system shows that none of the radial expressways will enter directly into Downtown Boston. All expressway users bound for Downtown must channel through the two entry points of the Central Artery: the high level bridge over the Charles River from Charlestown and the Central Artery in the South Bay Area. Both of these points threaten to become the bottlenecks of the expressway system.

The three southbound lanes of the high level bridge will be approached from three lanes of the Mystic River Bridge and from 3 lanes of the Northern Expressway. The actual interchange of the high level bridge will be two lanes wide from each direction. Thus the condition will be 6 lanes feeding into 4 lanes which feed into 3 lanes of the Central Artery. The reverse is true of outbound lanes. The same will be generally true of that section of the Central Artery between Dover Streets and Massachusetts Avenue where connections are made with the Southeast and Southwest Expressways. These situations will render useless about one half of the capacity of approaching expressways unless the Inner Belt is constructed and connected to these points to divert traffic around the Downtown area.

In any case these two expressway entry points will remain as congested and limiting entrances for expressway travel into Downtown Boston. If the Toll Road is extended into Downtown Boston as a substitute for the Inner Belt, all Toll Road traffic and users of other expressways with destinations beyond the Downtown area will be forced onto the Central Artery and through these two bottlenecks seriously aggravating the condition. The Central Artery would become a major avenue for through traffic approaching from the Northeast, North, West and South.

The amount of through traffic approaching Downtown is often as great or greater than that traffic destined for Downtown. For example 62% of the traffic approaching Downtown Boston from the northeast section of the Boston Region is destined for areas, south, southwest and west of Downtown. Until the Inner Belt is constructed as a component of the expressway network and connected to the Toll Road extension a major and ever increasing proportion of the capacity of the Central Artery, Storrow Drive and Downtown streets will be consumed by through traffic and not available for Downtown bound motorists.



DAILY MOTOR VEHICLE CAPACITY OF HIGHWAYS ENTERING DOWNTOWN BOSTON

TRAFFIC TO DOWNTOWN

TRAFFIC THRU DOWNTOWN

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HIGHWAY CAPACITIES

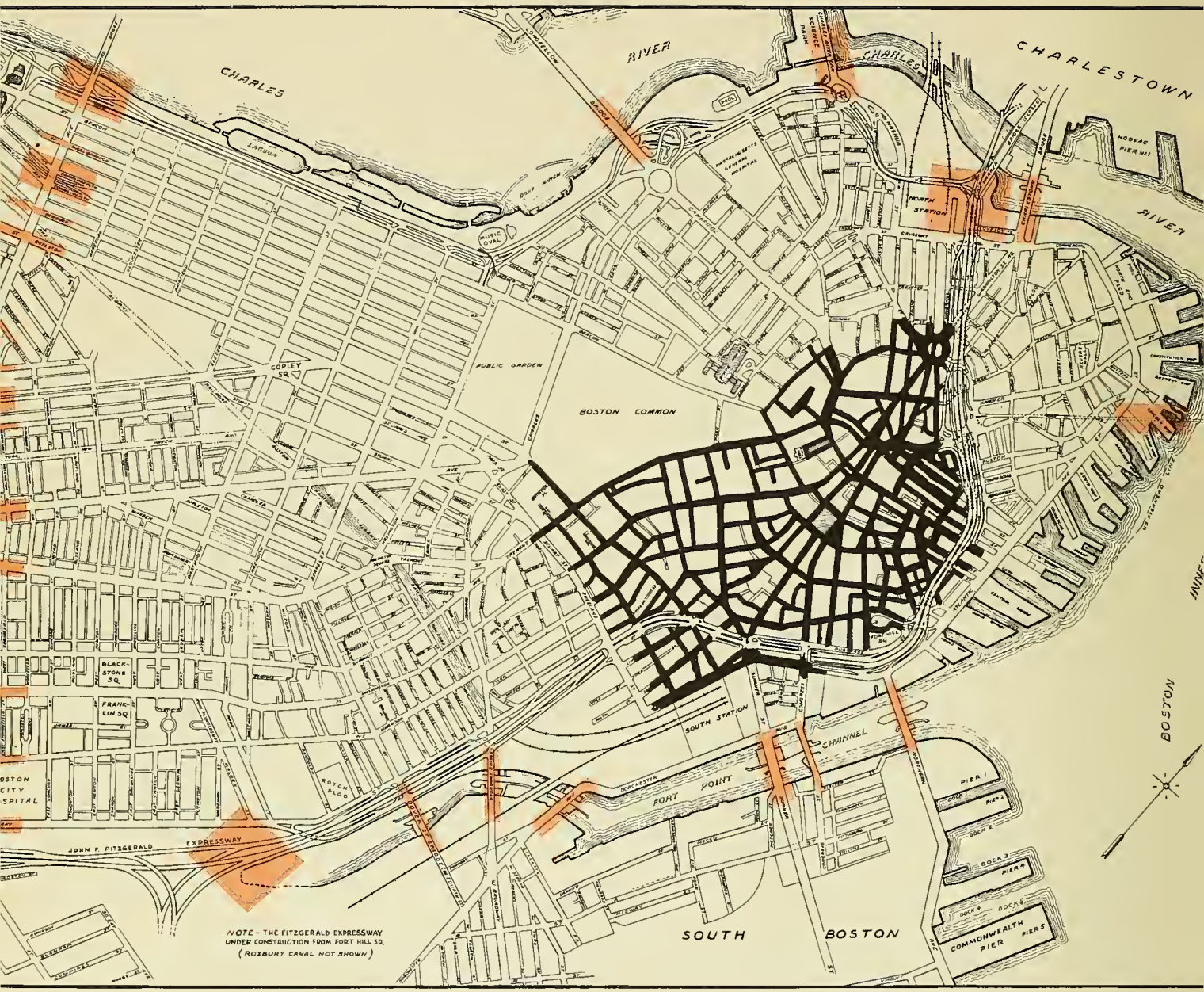
The street, highway and expressway capacity per motor vehicles entering into the Downtown area has been increasing since 1950. The first major increase was the Storrow Memorial Drive which created additional space for 50,000 vehicles per day in each direction.

The other major improvement is the Central Artery. In a few years when all approaches to the Central Artery are finished and connected to the completed expressway system an additional 180,000 motor vehicles per day will be able to enter and leave the Downtown area. The expressways will increase entering traffic by some 90,000 vehicles per day - an increase of 35% over the existing capacity of 260,000 motor vehicles.

Motor vehicles passing through the Downtown area will continue to consume some of this space. Traffic from one side of Downtown to another consumes between 20% and 25% of the highway capacity. When the central artery and its approaches are completed through traffic is expected to be one of its major users. Not until the Inner Belt section of the Expressway system is completed will it be possible to divert some of this through traffic and allow maximum use of the system for Downtown bound travel.

The last column of this chart shows the motor vehicle capacity required into Downtown Boston if everyone now travelling daily to the Downtown area were to use motor vehicles. The required capacity is enormously high, representing more than twice the total capacity of all highways after completion of the Central Artery. It is the equivalent of over 40 additional expressway lanes (for travel in both directions) or about 7 additional 6-lane expressways - the majority required just to serve peak hour travel.

The last column also shows the amount of additional capacity that would be created by the construction of a second harbor crossing and the extension of the Massachusetts Turnpike past the Inner Belt and into the Downtown Area.



DOWNTOWN BOSTON STREET CAPACITY

DOWNTOWN STREET NETWORK

CAPACITY OF ENTERING STREETS

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LOCAL STREET ACCESS AND PARKING

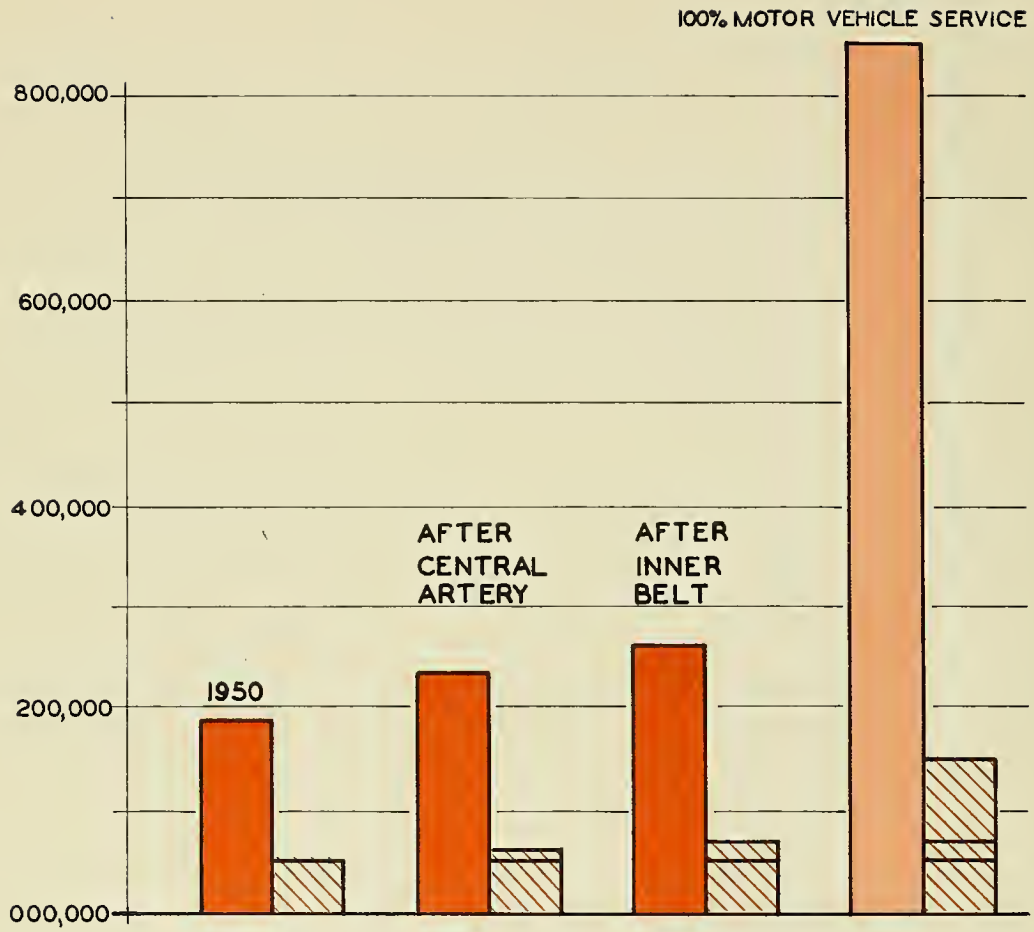
The expressway system as originally conceived in 1948 would provide much greater motor vehicle access to Downtown Boston. However, access to the Downtown area is not the major transportation problem facing Boston.

The major motor vehicle problem is the lack of adequate parking space and the inadequate system of local streets within the Central Business Area. The expressway system can be no better than the condition of facilities for local access and storage.

The local street system within the business area is not capable of carrying much additional traffic without redesign and reuse. The opportunities for improving local street vehicle carrying capacities do exist - and must be taken advantage of if the many millions of dollars invested in the Central Artery and expressways are to be utilized.

Parking is the major limitation of the Downtown area and is the barrier against additional motorists travelling to Downtown. The new expressways will not attract many more vehicles into Boston until more parking is available. New or additional motorists will be in direct proportion to the number of new useable parking spaces rather than to expressway capacities.

In 1950 there were, roughly estimated, 50,000 parking spaces throughout the Downtown area inside Massachusetts Avenue. Only one half of these were available to motorists destined for the Central Business District. Since that time the City of Boston's Off-Street Parking Program and private interests have increased this amount by over 5000 spaces.



DOWNTOWN BOSTON PARKING AND HIGHWAY CAPACITY

TRAFFIC TO DOWNTOWN

REQUIRED PARKING SPACES

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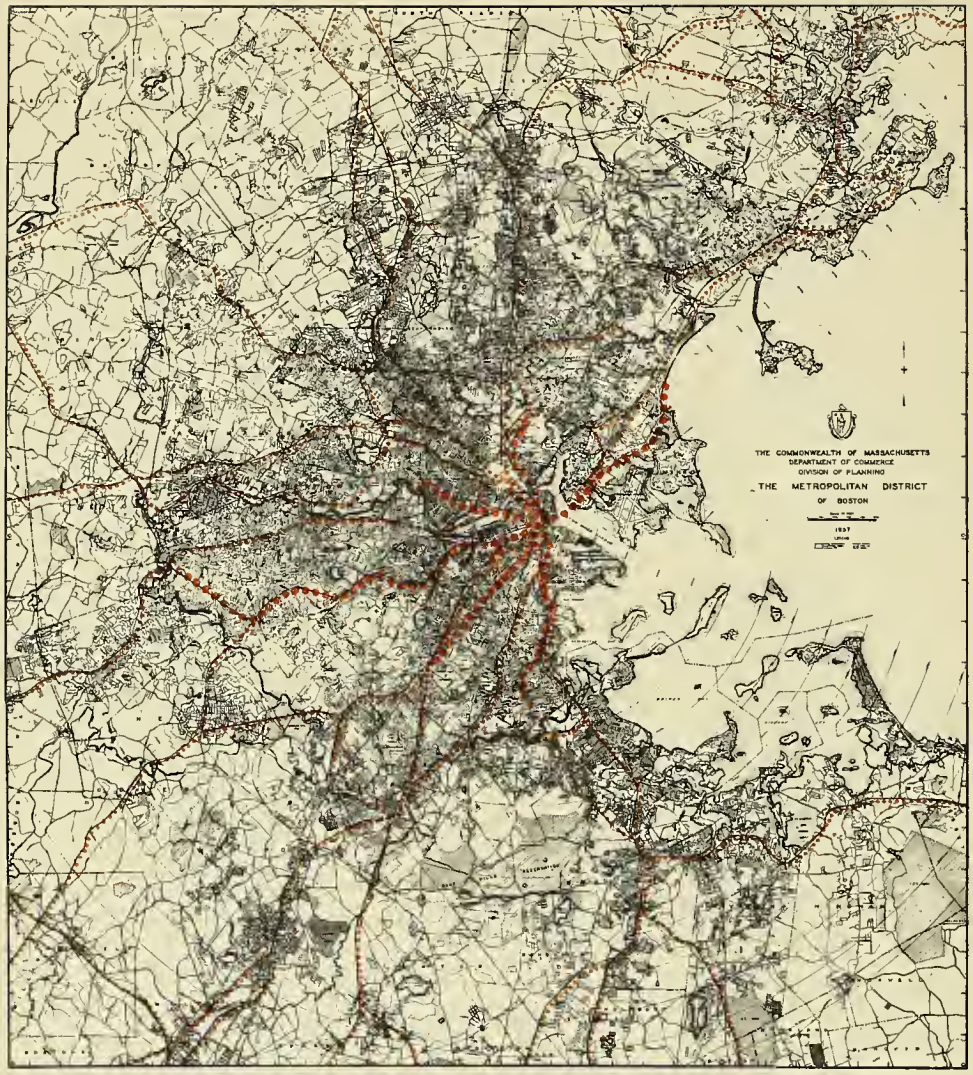
OFF-STREET PARKING

It must be the principal objective of the parking program to create a number of spaces sufficient to balance the increased ability of motor vehicles to enter the Downtown area. This means that there is a need for 10,000 to 15,000 more off-street parking spaces than now available. The chart on the opposite page shows the 15,000 spaces needed to balance the additional capacities created by the Central Artery and Inner Belt. Current plans and programs appear to be aimed at this general objective. The City's program calls for 6,000 to 8,000 new spaces; Prudential plans call for 3,000 to 5,000 spaces; the Civic Center will provide spaces for the new State Office Building, Federal Building and City Hall; redevelopment projects in the New York Streets and West End will include off-street spaces; and private investment will undoubtedly supply the remainder.

This amount of additional parking will prove adequate only if it is well used. If each of these new spaces is to be filled each day by one car - an all day parker - this number of spaces will prove to be far too inadequate and will necessitate the investment of two or three times as much land and dollars for additional spaces. If these spaces are made attractive to the short term parker through careful design, location and pricing 10,000 to 15,000 spaces will suffice.

The last column of this chart depicts the parking spaces needed if everyone now destined for Downtown used motor vehicles. The major difficulty inherent in such a situation is that all those working in Downtown now using mass transit would drive and require one space for each vehicle for all day. To serve this demand some 75,000 additional spaces would be needed or a total of well over twice as many spaces as are now available in the entire area north and east of Massachusetts Avenue. This number of additional spaces if enclosed in 6 story garages would consume at least 40% of the amount of land now devoted to commercial and industrial development in the Business District. Obviously the cost of such a program would be prohibitive ($200,000,000) and leave little space for commercial development to be served by the garages.



REGIONAL BOSTON RAILROAD AND MTA RAIL TRANSPORT LINES

MTA RAIL LINES
RAILROAD LINES

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MASS TRANSPORTATION

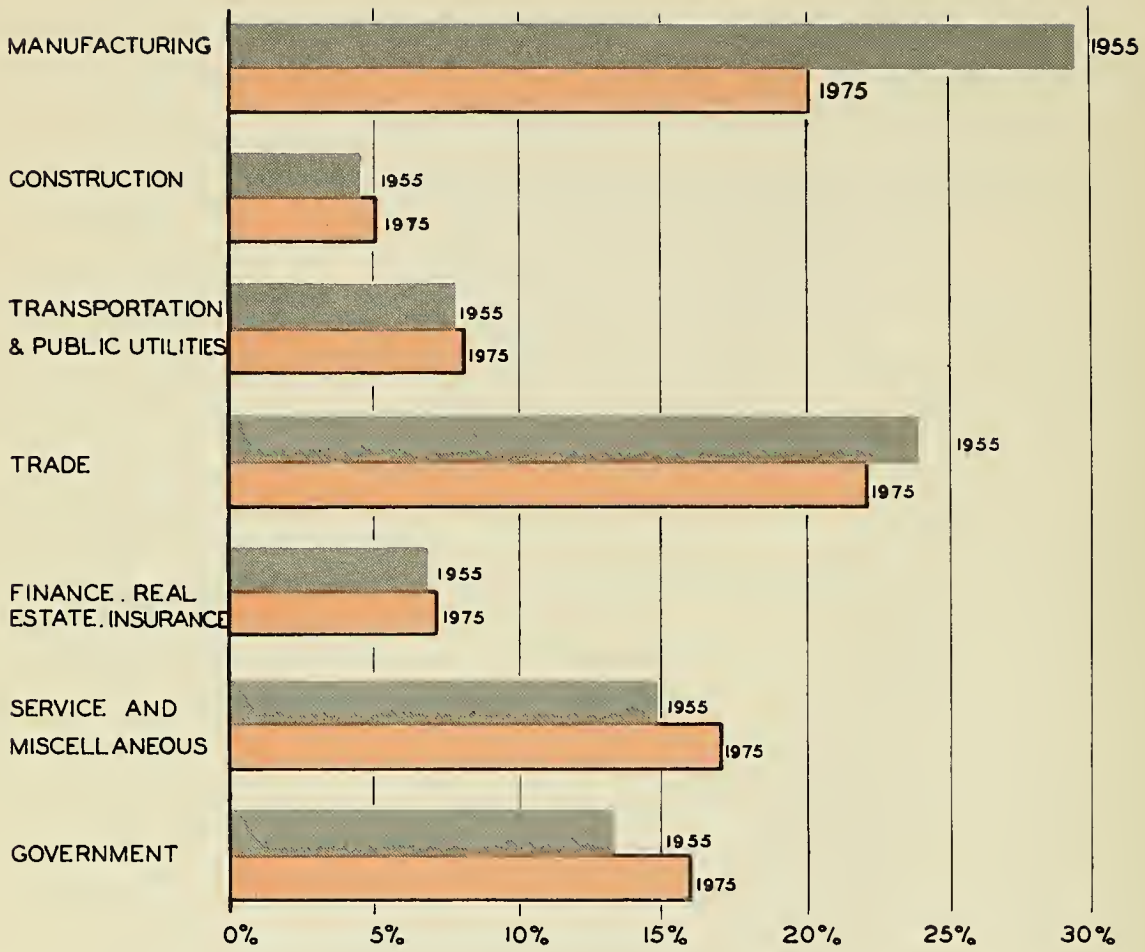
Mass transportation in the Boston region consists of the facilities of the Metropolitan Transit Authority and three major railroads - the B & A, the B & M and the N.Y., N.H. & H. The rail equipment of these organizations operating on reserved rights of way carry the lion's share of public transportation riders. These rail facilities are supplemented by the on-street operations of the MTA and of regional bus companies.

Taken as a whole the area has one of the best regional rail networks in the world. The downtown rapid transit system operates on its own structures without interference with surface traffic and can move large numbers of persons swiftly and efficiently.

Although the MTA system provides transportation between sub-centers of metropolitan residence and economic activity, the system is primarily a link between the downtown area and the suburbs. The railroads have always been of this character. It seems likely that in the future this function will become stronger and that the radial system now in existence will be sufficient to meet demand.

The MTA carries some 180,000 persons into the Downtown area on an average day. Since the war there has been a drop in MTA patronage each successive year. This drop has been caused by the reduction in travel to the downtown area, competition from the automobile, and the declining population of the area served. The district serviced by the MTA consists of 14 cities and towns in the inner metropolitan area. Most of these communities are fully developed and when taken together are declining in population. The role of the MTA as a regional system has been limited by its inability to extend its service to outlying areas. The only two postwar extensions of MTA rail service have been the extension to Wonderland in Revere and the recently approved extension over the Boston & Albany Highlands Branch to Riverside.

Mass transportation to outlying areas has been provided by the railroads. However, for many years all three of the railroads have been losing money on short-haul passenger service. The reasons for this have been the high cost of maintaining peak hour service, the expensive nature of equipment used, heavy labor costs, high terminal expenses and fares that do not cover these costs. Partly because of this the railroads have been weakened in their ability to perform their primary function of moving goods. The region has suffered from this loss. The future of the railroads in the short haul passenger business appears limited with a continuation of the weakening of service observed in the recent past the alternative to outright abandonment.



TOTAL METROPOLITAN BOSTON JOBS 1955 & 1975

STUDIES OF URBAN TRANSPORTATION

Seminar Research Bureau College of Business Administration
BOSTON COLLEGE MARCH 1958

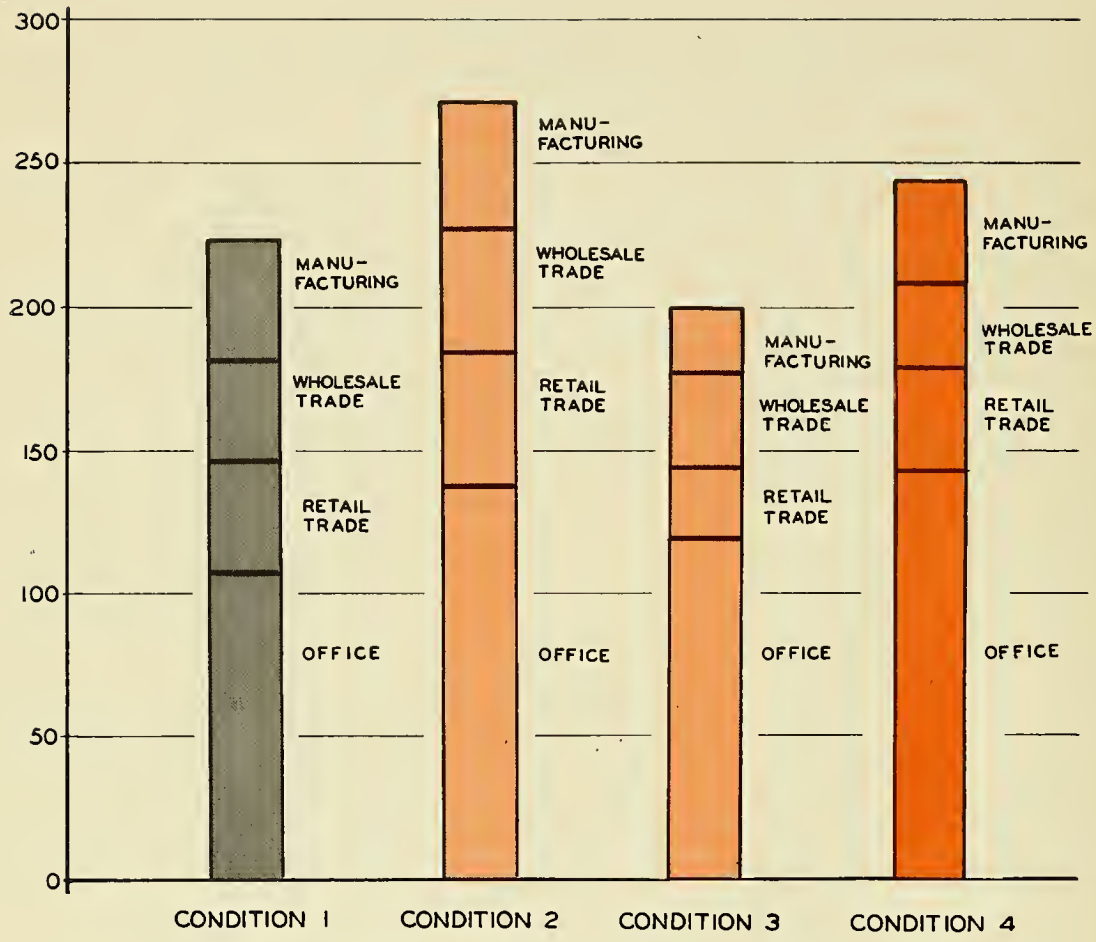
ECONOMIC GROWTH PROSPECTS

The amount of traffic to the downtown area during peak hours depends to a large extent on the number of jobs located there. Consequently in forecasting the transportation needs of the Central Business District it is necessary first to obtain some idea of the development of the economy of the area in the future.

The economy of metropolitan Boston now provides about one million jobs. Over 20% of these are located in Downtown Boston. By 1975 it is estimated there will be about 200,000 new jobs in the metropolitan area. The number of these jobs that will be in the Downtown area will depend on the nature of the new employment and on public policy concerning transportation and the development of the Downtown area.

The economy of the metropolitan area will change. To some extent the nature of the change is predictable. Manufacturing and trade are becoming less important as proportions of total employment. Government, at all levels, and service industries are becoming relatively more important.

It is in government and services that the downtown area has demonstrated its greatest locational advantages. Thus any realistic appraisal of the prospects of downtown cannot merely look to the recent past when highway construction and the resulting loss of building space have cut into downtown employment in manufacturing and wholesale trade. It must go beyond this and consider downtown prospects in the framework of a changing metropolitan economy.



PROSPECTIVE DOWNTOWN BOSTON JOBS 1975

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Looking into the future is at best a difficult task but a necessary one in planning public facilities. In forecasting the state of the Downtown economy we have made four different assumptions as follows:

Condition 1 - If Downtown economic activity is to neither grow nor decline the number of jobs in the area in 1975 will be slightly less than the current number. We estimate jobs in the Downtown area if this condition prevails will be about 220,000.

Condition 2 - If the industries in the Downtown economy are to grow at the same rate as the same industries in the metropolitan economy we would have about 270,000 jobs Downtown in 1975. This is an increase of 20%.

Condition 3 - If the rate of decline experienced in the period since 1948 is continued then we would have a total of 200,000 jobs Downtown in 1975. This is a decrease of about 10%.

Condition 4 - If only those industries which have demonstrated a locational preference for Downtown obtain for the downtown area its proportionate share of increased jobs, and other industries decline moderately, we can expect a total of 245,000 jobs. This is an increase of about 10%.

The probable limits within which the downtown area will change are represented by conditions one and two. Condition four represents the most likely nature and extent of development. Office space in the process of construction at the present time will provide accommodations for about 15,000 jobs. In view of the prospects of industries traditionally a part of the downtown economy and of current developments in the area growth of 10% is a realistic objective.

During the past few years there has been some decrease in the amount of wholesaling and manufacturing space in the downtown area. This has been due principally to the demolition necessary for the construction of the Central Artery. Despite some movement to the New Market area by food wholesalers there has been no general voluntary exodus of this industry from central Boston. The number of wholesalers who will leave in future years will be partly determined by the extent to which the advantages of a centralized area (allowing trading between firms, selection to buyers, and a wide range of supporting services) are offset by traffic congestion. In manufacturing, except for the displaced firms there has been no tendency for Boston to suffer absolute losses in employment. Manufacturing employment has stabilized and is spread over a large number of small establishments thus reducing the danger of sudden precipitous losses.

In retailing the amount of activity Downtown held level between 1948 and 1954. However, recently there has been a decrease in activity. It is probable that after this readjustment there will be relative stability in this industry.

The service industries in the downtown area have shown a very healthy growth in recent years. During the last inter-c~~a~~ensal period the proportion of metropolitan activity in services located in Boston actually increased. Increases in services have been accompanied by an increase in government employment. Boston today is exceeded only by Washington, D.C., and San Francisco in the proportion of its total employment in Government. There has been no evidence of a trend toward decentralization in government.

TRAVEL FORECASTS

The forecast of a ten percent increase in employment in the downtown area will have the following results:

1. There will be a continued demand for land both to serve the new growth and to replace obsolete structures.

2. There will be a change in the kind and location of activities downtown withless emphasis on retailing, wholesaling with stocks and manufacturing and more emphasis on service activities and office facilities. The Central Business District will contain more and more functions adapted to high density, centrally located buildings which cannot be fully serviced by motor vehicles.

3. The growth in downtown will generate proportional amounts of traffic during peak hours and almost proportional increases in total travel.

The prospects for growth are moderate. They do not in themselves create any large new transportation problems but will increase the severity of problems now confronting the downtown area. To appraise these problems a more detailed review of present transportation systems is necessary.

TRANSPORTATION SYSTEMS

Three services must be performed by an efficient transportation system serving the downtown area. They are: 1. collecting people bound for Downtown from a dispersed population. 2. carrying these people to the downtown area swiftly and cheaply. 3. distributing them close to their destinations.

In accomplishing these objectives both the motor vehicle system and mass transportation facilities need improvement.

The Motor Vehicle System: Until the post-war period motor vehicle facilities were inadequate to collect, carry and distribute at their destinations the motor vehicles whose operators wished to travel to downtown Boston. The Regional expressway system under development during the last decade promises, when completed, to eliminate the problems of collection and carrying of motor vehicles to the downtown area. The problem of distribution and parking within the downtown area will not be solved by any highway system.

The location and number of radials of the highway system promise to provide service to all sectors of the Boston Region. In the downtown area itself the Inner Belt and Central Artery together will provide a circumferential system encircling the area and serving to distribute traffic.

A system of expressways incorporating some of the changes that have been mentioned of late does not promise to serve motor vehicle traffic as efficiently as the original expressway network. Replacement of the Inner Belt by the Toll Road extension would seriously impair the transport of motor vehicles to and through Downtown Boston. Without the Inner Belt nearly all vehicles would be funneled onto the Central Artery and through the two bottleneck areas.

The principal fault of the motor vehicle system does not arise until the vehicles leave the expressways to enter the local street system. Then traffic congestion and lack of parking space indicate the deficiencies of the system in distributing traffic to its destinations. Until these limitations are removed, the expressways cannot be used to the optimum extent and the millions of dollars spent on them will not have been justified. The problem of the distribution of vehicles downtown remains the major bottleneck in the motor vehicle system.

The problem of parking will continue to limit the economic vitality of the downtown area until the number of spaces available is in balance with the capacity of the highways to permit vehicles to enter. In the near future 10,000 to 15,000 additional spaces should bring us close to that goal. However, because of the nature of downtown development, considerable additions may be necessary. Unless new parking spaces in substantial numbers are provided the completion of the Central Artery will bring with it an addition of vehicles, an aggravation of the illegal parking problem, and a weakening of the downtown areas ability to compete as a center of economic activity.

The problem of local street congestion is not solved so easily. The structure of the downtown street system limits both the speed and the volume of vehicle movement. While improvements to the system are possible we can never expect complete freedom from congestion downtown. But the local street system is becoming less adequate as the completion of new expressway facilities adds to the number of vehicles seeking to use it. The effect created by new vehicles is to slow the movement of traffic and thus cause economic waste through loss of time. The street system can not handle more vehicles than those admitted through existing entry points and those expected when the Central Artery is completed.

Beyond the Central Artery each new expressway lane to enter downtown Boston will require at least 4,000 new parking spaces. Each additional eight lane expressway to enter the downtown area such as the Toll Road extension will create the need for 15,000 new spaces to addition to those currently required if the expressway is to be fully utilized for downtown travel. This calls for investment of over $35,000,000 and would require expensive changes in the street system.

To accommodate the vehicles from even one new expressway entering the downtown area would require 30 garages storing 500 cars each. In terms of land consumption this would mean the diversion from commercial purposes of an area equivalent to the land enclosed by Washington, Tremont, Bromfield and Avery Streets, some fifteen to twenty acres.

The motor vehicle system's failure to deliver and store vehicles at their destinations is its weakness. The solution to this problem is expensive new facilities. It is also self-defeating if the health of the downtown area is the justification for the system. In using large areas of land for expressways, access ramps, street widenings, and garage space, the motor vehicle system while increasing the downtown asset of accessability reduces its asset of centrally located land. There is a point at which a stable balance allowing unlimited motor vehicle access to all wishing to enter can be obtained but only at a substantially reduced level of economic activity.

The Mass Transportation System: Mass transportation - the M.T.A. and the railroads - for over half a century was the principal means of travel to the downtown area. Only in recent years has the automobile begun to carry a majority of travellers with destinations in downtown Boston. As more people have been diverted from the mass transportation facilities to the motor vehicle the role of mass transportation has changed. Its principal business has come to be handling that portion of travel which cannot be handled by the motor vehicle. Its major role now and in the future will be to serve peak hour flows and some mid-day flows to highly centralized districts of office, retail and other commercial activity. It is this kind of travel that the motor vehicle cannot adequately serve. Because of the expected improvement in downtown parking and in access highways more people will be able to drive to the downtown area. Consequently the propsects for mass transportation in the future are that it can hold its own if it is strengthened but will probably gain few new riders.

As with the highway system, the purpose of mass transportation we are here concerned with is its ability to collect, transport, and distribute persons with origins in all parts of Regional Boston and destinations in downtown Boston. Its ability to distribute persons throughout the downtown area is reasonably good. Operating underground or on reserved rights of way the system contributes little to surface congestion or parking shortages. The distribution of stations through the area is good except that the North and South Stations are not centrally located and occasional bottle necks do occur on certain MTA lines.

Its efficiency in carrying people is high. The cost on the MTA is low but the comfort of service is lower than on the railroads. Railroad costs are substantially higher. The efficiency of both systems in conserving the time of the traveller is high.

The major weakness of the mass transportation system is its lack of ability to collect people in our growing region. The MTA, which carries three times as many downtown bound passengers as the combined rail system, serves an area containing less than 60% of the region's population. By 1975 unless the system is extended it will serve less than 50% of the region's population. Even in the area served the MTA must rely heavily on costly, time consuming surface vehicles which cause and suffer from traffic congestion.

Related to the general problem of mass transportation is the specific problem of the short haul commuter railroad lines. In recent years these lines have not been profitable for the railroads and it seems likely that there will continue to be a gradual attrition of service. The existence of the reserved rights of way of the railroads seems to offer the opportunity to solve some of the problems of mass transportation. Integration of these lines with the MTA is in most cases technically feasible and offers the following advantages:

1. It will provide a fully integrated regional system of mass transportation and assist in the problem of downtown distribution.

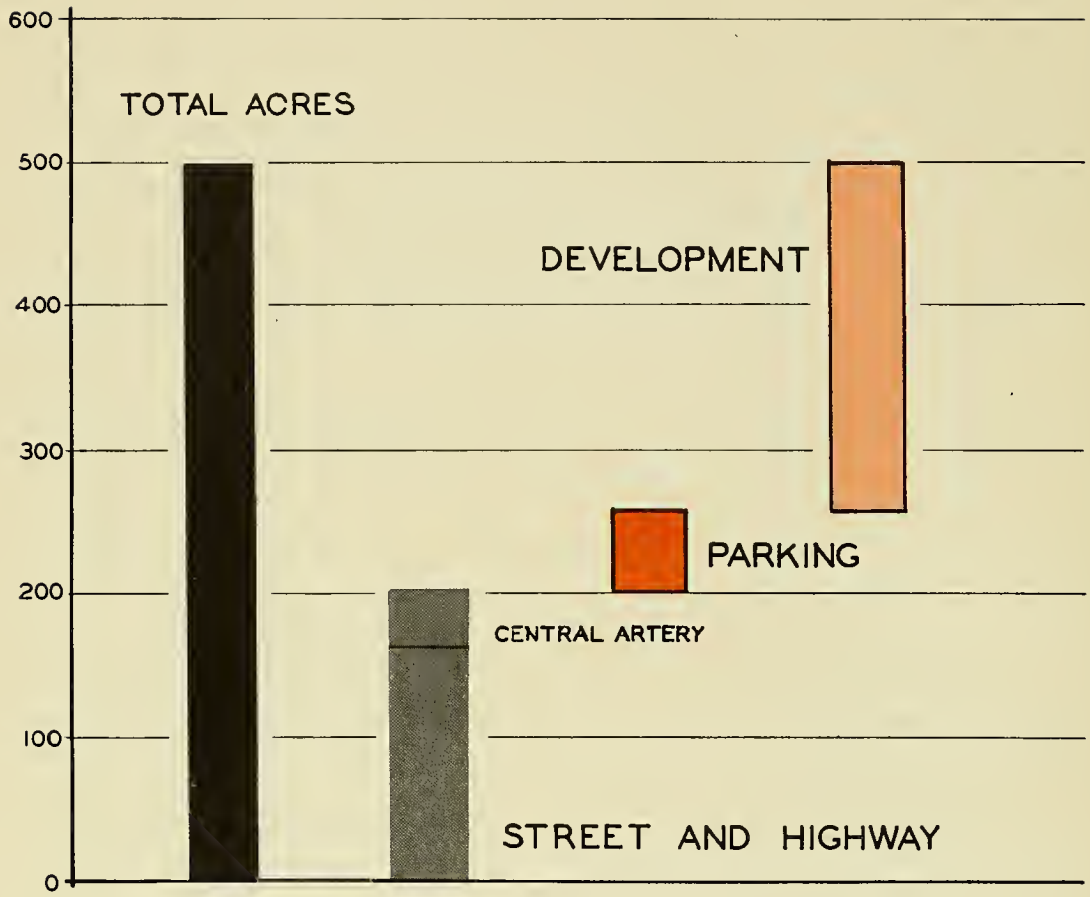
2. It will tend to preserve the economic viability of the downtown area by reducing the number of motor vehicles seeking entrance to the downtown area.

3. It will allow the MTA to provide frequent and cheap transportation to the rapidly growing areas of the region.

4. It will allow the MTA to replace and eliminate expensive feeder bus lines with the most efficient feeder service possible - terminal parking.

5. It will provide an efficient substitute for present users of rail facilities.

The advantages of absorbing some rail lines into the regional transportation authority are apparent. However, certain problems must be solved even if we accept an integrated rapid transit system as desirable. These problems include the priorities of the various possible lines in terms of economic feasibility, the optimum length of transit extensions, the means by which capital and operating costs of an expanded system are to be met, and the kind and frequency of service on specific lines.



ALLOCATION OF BOSTON CENTRAL BUSINESS DISTRICT LAND

STUDIES OF URBAN TRANSPORTATION

Seminar Research Bureau College of Business Administration
BOSTON COLLEGE MARCH 1958

EVALUATION

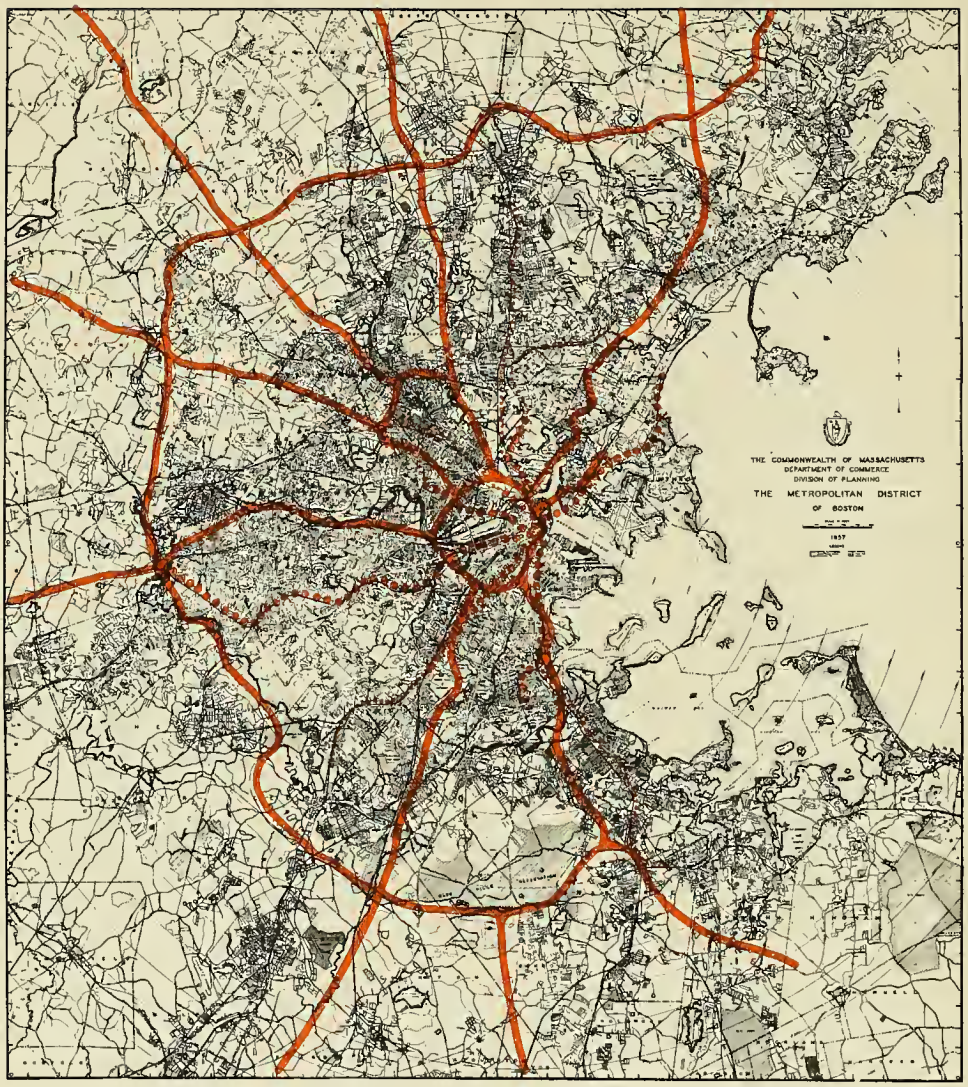
The conclusions of the analysis are that both systems of transportation have weaknesses and limitations. These disabilities have been described within the framework of the system's principal functions - gathering people, moving people, and distributing people to their destinations. It has been shown that the motor vehicles system fails to distribute and store vehicles in the downtown area in quantities consistent with its capabilities to collect and carry. The mass transportation system on the other hand fails to collect passengers from a growing region in quantities consistent with its ability to carry and distribute people.

In both cases it is apparent that capabilities to transport people are not major limitations of either the planned expressway system or the existing mass transportation system. The solution to Boston's transportation problem lies then in the direction of improving facilities for collecting and distributing people. It also lies, however, in preserving what exists in mass transit and obtaining what is planned in expressways.

Beyond this, the hope for a future full of vigorous economic activity for downtown Boston depends on how well it utilizes its assets. The transportation system is itself among the most important of these assets since it makes the downtown area the focus of the region. But over-development of this system without regard to other assets can be self-defeating. The compactness and density of activity in the downtown area is another asset of great importance. The preservation of this density and its encouragement to grow depends upon wise use of the small land area of downtown Boston.

The total area within Massachusetts Avenue is 1700 acres. Much of this is in residential and institutional use. About 500 acres are in the heart of the downtown area - the Central Business District. The chart on the opposite page shows how these few acres are used. Only 48% is used for building while 52% is used for streets, parking and other accommodations for the automobile. One motor vehicle facility alone - the Central Artery - now consumes an area equivalent to one-sixth of the area devoted to commercial and institutional buildings in the Central Business District.

The areas needed to serve the automobile will be expanded as garage space is enlarged and the street pattern altered. Additional commercial land, on the other hand, will be needed if the area's potential for growth is realized. These demands for land must be balanced in some logical relationship which will foster downtown prosperity.



PROSPECTIVE REGIONAL TRANSPORTATION SYSTEM

EXPRESSWAYS

MTA RAIL LINES & POTENTIAL EXTENSIONS

STUDIES OF URBAN TRANSPORTATION

Seminar Research Bureau College of Business Administration
BOSTON COLLEGE MARCH 1958

RECOMMENDED TRANSPORTATION POLICY FOR DOWNTOWN BOSTON

Five distinct conclusions can be drawn from the analysis above that establish the direction of Downtown transportation policies.

1) Estimates of economic and travel activities indicate increases of the magnitude of 10% over a 15 to 20 year period.

2) The nature of changing and growing economic activities indicate an increasing demand for Downtown land and for adequate parking and transportation services.

3) The automobile can not fully serve Downtown Boston under the above conditions and mass transportation facilities must continue to be utilized and improved.

4) The magnitude of economic and travel estimates do not in themselves present large new transportation problems. Efforts to improve regional transportation facilities must be primarily directed toward the repair of internal weaknesses of each of the existing transportation systems.

5) All transportation agencies must construct and operate transportation facilities within common goals reflecting reasonable economic forecasts and travel estimates.

Expressways: The original expressway system should remain as the basic regional plan for expressway development. This system consists of the Central Artery, the Inner Belt and seven radial expressways connecting and providing interchange with Route #128 and the Inner Belt. This network appears adequately expansive and internally flexible enough to serve all sectors of the Boston region and Downtown Boston. As a unified system it provides reasonable radial and crosstown circumferential service. It provides downtown Boston with all the motor vehicle capacity required and reasonably handled for many years to come.

Improvements to the design of the original expressway network should be encouraged and receive concentrated public review. Changes to the fundamental radial and circumferential expressway pattern should be fully justified, publicly reviewed and cautiously evaluated. Constructing radial expressways past the Inner Belt without interchange such as has been suggested for the Toll Road extension; constructing additional expressways into Downtown Boston such as the Toll Road extension; or replacing the Inner Belt with the Toll Road extension connected to the Central Artery would destroy the workability of the original expressway system. Such changes must be fully evaluated in terms of regional and downtown traffic and parking requirements before receiving public acceptance.

The Inner Belt, the Southwest Expressway and a connection between the Toll Road and the Inner Belt are the three major projects that have not yet officially approached the construction stage. All of these facilities are vital to the workability of the entire system. The Inner Belt is of particular importance because of the relief it will provide inner communities from crosstown traffic now using local streets. It's value to Downtown is apparent upon recognition of the steadily increasing amounts of through traffic which threaten to consume a major proportion of Central Artery capacity if the Inner Belt is not appropriately designed and constructed.

Finally, with regard to the expressway system, a much greater attempt should be made to coordinate and integrate expressway construction with urban renewal and redevelopment projects and with mass transportation planning. The opportunities will arise where the amount of Federal Aid and community achievement can be substantially increased if highway and redevelopment demolition take place in the same location at the same time. With respect to mass transportation, Federal Highway funds cannot now be used for rapid transit facilities. but with careful design can be used, for example, in creating access to badly needed MTA terminal parking areas.

DOWNTOWN LOCAL STREET ACCESS

It is recommended that major emphasis be placed on correcting this primary weakness of the motor vehicle system serving Downtown by creating a street system capable of accommodating the influx of vehicles expected on the Central Artery. The job, while expected to cost relatively little, will require a maximum of ideas, imagination and experimentation. There is every reason to believe that substantial improvements can be accomplished through use of the techniques mentioned below. However, it is reasonable to also expect that the capacity of the Downtown street system will never be great enough to completely eliminate traffic congestion.

To overcome much of the street system's inability to allow traffic to move freely it is recommended that a study be undertaken and a plan prepared that will:

a) Redesign and classify the downtown street system to identify the best combinations of major, minor, and parking streets required by the reoriented traffic flows caused by the Central Artery and by the location of newly constructed and planned parking garages.

b) Reconvert on-street parking areas to moving traffic as determined by the classification plan and carefully time this to accompany the construction of new off-street parking facilities.

c) Improve traffic flow on Downtown streets through the separation of conflicting flows of traffic and the use of new traffic control devices. This might include the separation of two directional flows by a more extensive system of one-way streets, separation of major passenger and truck flows, separation of major vehicle flows and local access traffic movements, and, where possible, separation of vehicle flows from major pedestrian gatherings. Traffic control devices that may deserve greater use include synchronized automatic traffic light systems and traffic islands for channelising vehicle movements.

DOWNTOWN OFF-STREET PARKING PROGRAM

The planned off-street parking programs of private enterprise and the City Of Boston will provide what appears to be a satisfactory minimum number of new spaces - 10,000 to 15,000. These will be adequate to balance the increased capacity of the Central Artery if they attract a large percentage of short-term parkers engaged in shopping, business and entertainment trips.

If, however, these spaces are to be fully used by all-day parkers many more facilities will be required. It is recommended, therefore, that the pricing system be utilized to regulate the length of parking by imposing higher hourly parking fees for all-day parking and a lower fee for one, two and three hour parkers. Bargain rates for parking should be available for the short trip rather than the person occupying one space for eight hours.

The off-street parking program of the city should be kept moving at a fast pace. Parts of the Central Artery have already been finished and other connections to the south and north will be completed within a year or two. The parking programs deserve continual review and modification by the responsible agencies in view of changing conditions and needs including the development of new areas such as the Civic Center.

MASS TRANSPORTATION SYSTEM

Despite the post-war losses of riders the influence of rapid transit and railroads in the long term development of Downtown Boston cannot be ignored. Neither can the more obvious implications of attempting to serve everyone travelling to the Central Business District by automobile.

It is a clear and simple fact that mass transportation will continue to have a vital role in moving people to and from Downtown from all sections of the region. Although temporary losses are expected until new Downtown development takes place mass transportation must be counted upon to carry about as many people in the future as it does now. The longer range development prospects for Downtown actually depend upon whether mass transportation can assume these responsibilities.

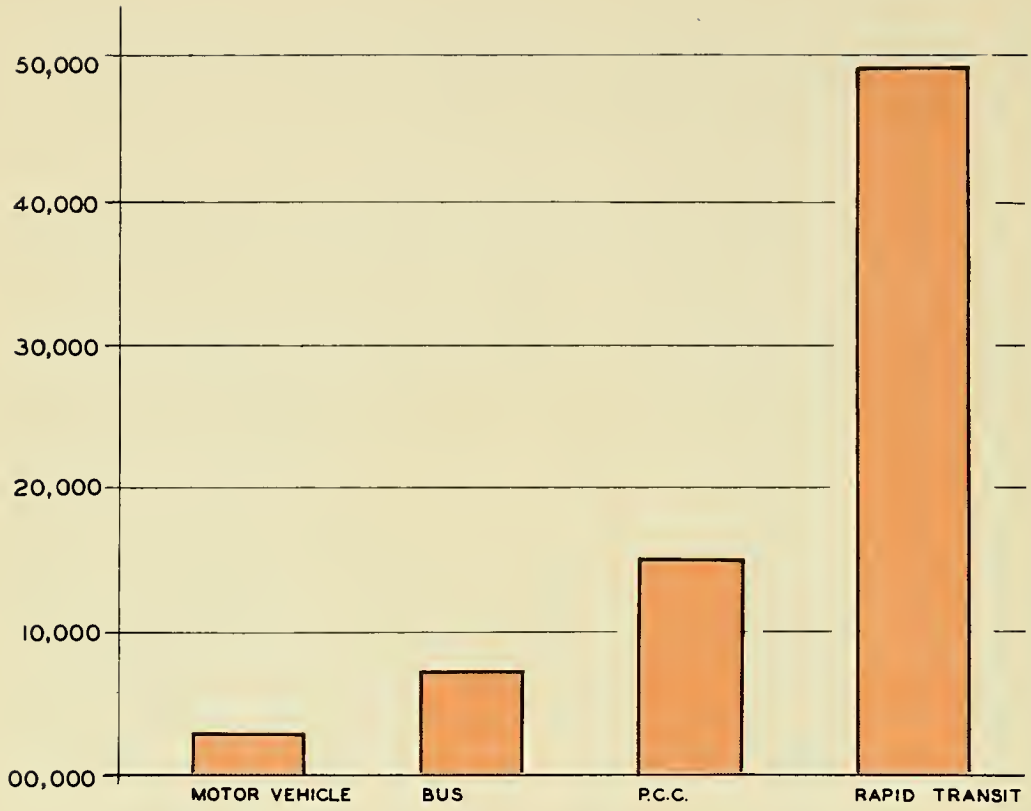
It is recommended that the long range objectives of Regional Boston by the creation of a single, physically integrated mass transportation system, serving at least this area withing 10 miles of Boston. Such a system, with the MTA as a foundation, should be given public backing and permission to improve it's ability to collect people from throughout the Boston Region. This means that some rapid transit lines should be extended and other forms of service should be expanded.

It cannot be said without study that extensions of service will add to or lessen MTA deficits. Increasing proportions of peak hour users create difficulties that may not allow complete deficit elimination. The many phases of mass transportation financing, fares, defects and deficit assessments deserve a complete and comprehensive study and analysis.

It is recommended that a survey study be undertaken for the purpose of determining which three, four or five rapid transit extensions make the most sense from the viewpoints of the MTA, the railroads and Downtown Boston. This study should be undertaken and finished in 1958, not encumbered with excessive engineering detail, and should indicate:

a) the most desired combinations of rapid transit extensions, PCC and bus feeder service, express bus service along new expressways, and terminal parking facilities necessary for the region.

b) approximate costs of acquiring, constructing, financing and operating recommended services, and estimates of passenger loads and frequency of service.



PASSENGER CAPACITIES OF TRANSPORTATION FACILITIES

PRACTICAL PER HOUR PER LANE CAPACITY

STUDIES OF URBAN TRANSPORTATION

Seminar Research Bureau College of Business Administration
BOSTON COLLEGE MARCH 1958

Because of highway and parking construction, total mass transportation riders will increase by little if at all. The transfer of riders from railroad to MTA represents the number of additional riders that can be gained by the MTA; perhaps slightly more if service becomes excellent. In view of this fundamental condition mass transportation development should be moderate in scale. Rapid transit extensions might continue along available railroad rights of way to just beyond the inner urban population concentrations to large tracts of open land available for terminal parking lots. Maximum attention should be given to the development of more flexible and less costly services connecting with rapid transit or serving Downtown directly. Terminal parking lots are the least expensive and most desirable type of feeder service available.

The formulation of this mass transportation development program should consider all rail lines of the New York, New Haven and Hartford, Boston and Albany, and Boston and Maine. Particular emphasis must be given to those rail rights of way which can be abandoned by the railroads most easily and inexpensively.

The extensions that appear to offer the best possibilities are:

a) Extension of the Harvard-Ashmont rapid transit line along Old Colony tracks through Quincy and Braintree to large vacant land areas available for parking. The timing of abandonment of rail service on the Old Colony appears so close at hand that detailed engineering plans for an MTA extension should be quickly prepared so that an alternative solution will be available with the least loss of time.

b) Extension of the Everett-Forest Hills line through Roslindale and West Roxbury to large parking areas accessible from Route 128 and capable of serving motorists from Needham, Dedham and beyond. The planning of this extension should be coordinated with the construction of the Southwest expressway, urban redevelopment or urban renewal in parts of Roxbury and possibly use of part of the New York, New Haven and Hartford main line tracks in Roxbury which would allow the demolition of the Washington Street Elevated structure.

c) Extension of rapid transit service through North Cambridge and possibly Somerville to potential parking areas near the Arlington-Cambridge town line. This extension may be from Harvard Square via tunnel or from Lechmere Square via a Boston & Maine right of way.

d) Extension of rapid transit service from Sullivan Square or Everett to the north along whichever Boston & Maine right of way that the railroad can best abandon, that the MTA can provide optimum service and that the greatest amount of terminal parking can be provided.

TRANSPORTATION PLANNING

During the past half-century transportation in Boston has been in a permanent state of crisis. One has only to review the floods of reports to quickly sense that the problem has changed little. Under the heading "The Paramount Question" the Report of the Commission on Metropolitan Improvement of 1909 stated "In view of the wide variety of subjects which were open for discussion before the commission it was a notable fact that inquiries throughout the Metropolitan District, as well as the statements made and evidence offered at the various hearings, disclosed it to be the very general belief of the public that the question of transportation was the most urgent one to be considered, and that the future commercial and industrial interests of the Metropolitan District, and therefore of Massachusetts depended in great measure upon its proper solution." This commission however held a view which has been considerably weakened of late when it said "Indeed, it was agreed upon by all, even by those who differed on almost every other subject, that the commercial and industrial future of the Metropolitan District is intimately and inseparably involved in the future growth and prosperity of Boston, and that the promotion of the interests of Boston is of vital moment to the entire Commonwealth."

The paramount question is still transportation and the prosperity of the area. During the past half-century we have devised ways of meeting the rise of the truck and the decline of the team, we have replaced the old street railways with high speed rapid transit, but we have failed to develop a method of looking to the future, anticipating change, and planning for it. The field of transportation is honeycombed with governmental agencies each with specific jurisdictions but none with the power to take the comprehensive and long view.

So the Paramount Question is when and how can be obtain an agency that will anticipate crises and act to avoid them. Such an agency should provide factual data for the setting of goals. It must be comprehensive in its view and its decisions must have weight with operating agencies. Only when such planning has been performed will it be possible to obtain an efficient and sensible transportation system in which each mode plays that role for which it is best equipped.

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